Kelsey Houston-Edwards Interview

Conducted by Alexander Diaz-Lopez

Houston-Edwards is a graduate student at Cornell University working on probability theory. She is host and writer of the *PBS Infinite Series* YouTube show. She is an alumna of Reed College and was the 2016 AAAS-AMS Mass Media Fellow.

Diaz-Lopez: *When did you know you wanted to be a mathematician?*

Houston-Edwards: Rather than happening at one sudden moment, my appreciation for mathematics grew as I gained exposure. And it's still growing! I dropped out of high school in the middle of tenth grade, and I didn't go to school for a while. I wasn't interested in school: not that I wasn't interested in learning, but I wasn't interested in the way things were taught.

After some time, I went to community college and started taking math and science classes. Then I decided to transfer to a four-year college, and I had to pick a major. I realized that the part of the science classes that I liked the most was the math, so I applied to transfer as a math major.

My favorite moment was when a friend of mine, who was a graduate student in physics while I was in community college, tried to convince me to transfer as a physics major instead of math. He pulled out a book with an illustration of the Banach-Tarski paradox and pointed out how ridiculous it was. That was his argument against math, which I think is funny because measure theory was one of my favorite parts of math, so he was totally wrong about what I liked. I wanted to understand the paradox; I wanted to know why "one ball equals two."

Diaz-Lopez: *Who encouraged or inspired you (mathematically or otherwise)?*

Houston-Edwards: In community college it was my interest in math that kept me doing math, but it was my English teachers who kept me engaged in school. I had an English teacher, Lisa Neville, who was phenomenal, and I really connected with her. She is the one who encouraged me to transfer to a four-year college.

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Once I transferred to Reed College, I was very lucky to have a very supportive academic advisor, Jim Fix. I also developed an interest in philosophy, and I ended up studying both math and philosophy. I had a wonderful philosophy advisor, Paul Hovda. I took his logic course my first semester and really connected with the subject.

Diaz-Lopez: *How would you describe your research to a fellow graduate student?*

Houston-Edwards: Broadly, I'm interested in probability theory. More specifically, my thesis research develops estimates for the discrete heat kernel on various graph domains. There's quite a bit known about heat kernel estimates on manifolds, especially in terms of their

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geometric features. Much of my thesis work goes into adapting the techniques from the continuous setting to a discrete one. Hopefully, after overcoming some of the technical difficulties that arise in graphs, we'll be able to recover many of the continuous results.

I also recently co-authored a paper on how to fairly divide rent when one roommate's rental preferences are secret. Part of that research was originally presented in a *PBS Infinite Series* episode, which makes me especially fond of it.

Diaz-Lopez: *All mathematicians feel discouraged occasionally. How do you deal with discouragement?*

Houston-Edwards: There is a short-term answer and a long-term answer. In the short-term, if I'm frustrated, I take a break to do something physical, like going to yoga class.

In the long-term, I've tried very hard not to follow a set path. My background is already pretty unusual, so I am not that worried about being different from other people. I don't feel a lot of pressure to go down the standard tracks, so I focus on the parts of my graduate career that work for me. For example, I really like public engagement and hosting a PBS show. It takes some time, but doing that kind of work, teaching and talking to people about the role of math in their life, gets me through the moments when I'm more frustrated with research and course work.

Diaz-Lopez: *This past summer, you were an AAAS-AMS Mass Media Fellow. What were your responsibilities, and what was a normal day like during this time?*

Houston-Edwards: I was at *NOVA Next. NOVA* is a long-running science TV show, and *NOVA Next* is the affiliated digital magazine. It publishes articles about daily happenings in science. I worked as a writer for the website and wrote about all kinds of science.

Every day *NOVA Next* publishes a short article about something cool that's happening in the world of science and once a week a big feature article. Some days I would walk in the office and the editor would hand me an article and tell me, "By the end of the day you need to read this paper, understand it, and write 400 words about it—go." That was really stressful in the beginning and then fairly easy later. You get used to it. Other days I would focus on writing long feature articles. I wrote three features that were a couple thousand words each.

Diaz-Lopez: *You are the host and writer of theYouTube show* PBS Infinite Series*. How did you get involved in this show?*

Houston-Edwards: The very first week of my fellowship at *NOVA,* a professor at Cornell was contacted by a casting company that was looking for a host for the YouTube show. He then forwarded the call for a host to the entire mathematics department. I figured, "Why not?" I thought there was no way it was going to work out, but it seemed worth trying, so I applied. I then went down to New York City and did an on-camera interview, which is one of the most nerve-wracking things I've ever done in my life. It had all the pressure of a job interview, plus I was staring at a camera and surrounded by a green screen and a box of light [see Figure 1]. I also got to meet the producer, who is a really wonderful person. Luckily, they offered me the position.

Diaz-Lopez: *What do you aim to achieve with this project?*

Houston-Edwards: First, let me say that I am having a lot of fun, so I aim to keep doing this really cool job that I happened into. Moreover, it's pretty clear that there is huge interest in math presented in a challenging, but not academic, way. I'm trying to pique people's curiosity in a different format from the ones they are used to.

In an on-camera interview, Houston-Edwards found herself staring into a camera while surrounded by a green screen and a box of light.

My secret mission for the show is for people not to think of math as a dead art, as something that was handed to us years ago. That for me has been a really big portion of the show, to feature current mathematics. Our very first episode was about the recent solution to the sphere-packing problem.[1] I wanted to set the tone: we want to give you a peek at what it is like to be a mathematician, and part of that is to realize that math is growing.

That you can get a PhD without graduating from high school often shocks people.

Diaz-Lopez: *What is something people might be surprised to learn about you?*

Houston-Edwards: I didn't graduate from high school. The fact that you can get a PhD without graduating from high school is often shocking to people. Also, I have a three-legged dog named Indra. As I was adjusting to school, she was a big stabilizing factor in my life, and she is very important to me.

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Alexander Diaz-Lopez

ABOUT THE INTERVIEWER

Alexander Diaz-Lopez, having earned his PhD at the University of Notre Dame, is now assistant professor at Villanova University. Diaz-Lopez was the first graduate student member of the *Notices* Editorial Board.

[1] *See "A conceptual breakthrough in sphere packing" by Henry Cohn,* Notices of the AMS, *February 2017,* www.ams.org/notices/201702/rnoti-p102.pdf .

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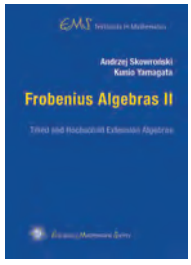

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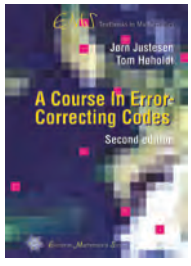

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